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EXAMINER

SOUW, B

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 05/08/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trad marks**

# Office Action Summary

Application No.

09/321,518

Applicant(s)

Gilton t al.

Examiner

Bernard Souw

Group Art Unit

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☒ Responsive to communication(s) filed on May 27, 1999

☐ This action is **FINAL**.

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 35 C.D. 11; 453 O.G. 213.

A shortened statutory period for response to this action is set to expire 3 month(s), or thirty days, whichever is longer, from the mailing date of this communication. Failure to respond within the period for response will cause the application to become abandoned. (35 U.S.C. § 133). Extensions of time may be obtained under the provisions of 37 CFR 1.136(a).

## Disposition of Claim

☒ Claim(s) 1-46 is/are pending in the application.

Of the above, claim(s) 1-38 is/are withdrawn from consideration.

☐ Claim(s) \_\_\_\_\_ is/are allowed.

☒ Claim(s) 39-46 is/are rejected.

☐ Claim(s) \_\_\_\_\_ is/are objected to.

☐ Claims \_\_\_\_\_ are subject to restriction or election requirement.

## Application Papers

☒ See the attached Notice of Draftsperson's Patent Drawing Review, PTO-948.

☐ The drawing(s) filed on \_\_\_\_\_ is/are objected to by the Examiner.

☐ The proposed drawing correction, filed on \_\_\_\_\_ is ☐ approved ☐ disapproved.

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. § 119

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

☐ All ☐ Some\* ☒ None of the CERTIFIED copies of the priority documents have been

☐ received.

☐ received in Application No. (Series Code/Serial Number) \_\_\_\_\_.

☐ received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\*Certified copies not received: \_\_\_\_\_

☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

## Attachment(s)

☒ Notice of References Cited, PTO-892

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 2

☐ Interview Summary, PTO-413

☒ Notice of Draftsperson's Patent Drawing Review, PTO-948

☐ Notice of Informal Patent Application, PTO-152

— SEE OFFICE ACTION ON THE FOLLOWING PAGES —

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## **DETAILED ACTION**

### ***Restriction***

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
  - I. Claims 1-38, drawn to the process of making a semiconductor device, classified in class 438, subclass 618<sup>+</sup>,
  - II. Claims 39-46, drawn to an apparatus for processing (cleaning/etching) a semiconductor wafer, classified in class 134, subclass 1<sup>+</sup>.

2. The inventions are distinct, each from the other because:

Inventions I and II are related as process of making a semiconductor device and apparatus for processing a semiconductor wafer. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be carried out using functionally and structurally different apparatus, or (2) that the apparatus as claimed can be used to carry out another and materially different process (MPEP § 806.05(f)).

In the instant case, the process of etching photoresist patterns from the surface of a semiconductor wafer can be made by plasma etching in a plasma-etch apparatus, which is functionally as well as structurally distinctive from the wet-etch apparatus claimed in the current application.

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*Election*

3. During a telephone conversation with Ms. Lisa M. Caldwell, Reg. No. 41,653 on 05/01/2000, a provisional election was made with traverse to prosecute the invention of an Apparatus, Claims 39-46. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-38 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

4. Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a petition under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

5. Applicant's election of claims 39-46 during the phone conversation on 05/01/2000 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

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**35 U.S.C. 102 (a) and/or (e) Rejections**

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 39, 42, 44, and 46 are rejected under 35 U.S.C. 102(a) or 102(e) as being clearly anticipated by Bergman et al.

Bergman et al. disclose an apparatus shown in Fig.4 for cleaning semi-conductor wafers, the wafers having first and second wafer side surfaces, the apparatus comprising:

- a chamber 15 sized to receive at least one wafer 20 to be cleaned, as recited on pg.12/ll. 13-19;
- a solvent applicator <sup>nozzle or evaporator</sup> 40 coupled to the chamber 15 and adapted to apply a solvent to at least one of the first and second side surfaces of the wafer 20 positioned within the chamber 15 so as to form a film of liquid solvent on said at least one of the first and second wafer side surfaces, as disclosed on pg.13/ll.3-9 but especially on pg.26/ll.9-12 and depicted in Fig.4;
- a gas source 75 of at least one reactive gas coupled to the chamber 15 so as to deliver such gas to the chamber (through applicators 230), the at least one reactive gas being selected to chemically

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react with the surface of the wafer to clean the wafer, as recited on pg.6/ll.18-24 & pg.7/ll.1-4; and wherein

- the liquid solvent comprises a transport medium which carries at least some of the at least one reactive gas through the film (by diffusion as a means of transport, as recited on pg.6/ll.20-22) ) to said at least one of the first and second wafer side surfaces where at least one reactive gas chemically reacts with said at least one of the first and second wafer side surfaces, as recited on pg.6/ll.18-24 & pg.7/ll.1-4.

- Regarding claim 42, Bergman et al. disclose an apparatus shown in Fig.4 for delivering ozone gas to the surface of a wafer, the apparatus comprising:

- a wafer receiving chamber 15, as recited on pg.12/ll. 13-19;
- a wafer carrier 25 positioned within the chamber 15 and carrying at least one wafer 20, as recited on pg.5/ll.17-18;
- a liquid depositor 40 to form a layer of liquid on at least one major surface of a wafer 20 supported by the wafer carrier 25 within the chamber 15, as disclosed on pg.13/ll.3-9 but especially on pg.26/ll.9-12 and depicted in Fig.4;
- an ozone gas source 75 coupled to the chamber 15 so as to deliver ozone gas to the chamber through depositors 230) and increase the concentration of ozone gas within the chamber 15, as recited on pg.6/ll.11-24 & pg.7/ll.1-4; and wherein

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- the liquid layer transporting ozone gas to the surface of the wafer 20 (by diffusion as a means of transport, pg.6/ll.20-22), as recited on pg.6/ll.18-24 & Pg.7/ll.1-4, to thereby expose the wafer surface to ozone, as recited on pg.6/ll.18-24 & pg.7/ll.1-4.

● Regarding claim 44, Bergman et al. disclose an apparatus shown in Fig.4 for cleaning semiconductor wafers, the apparatus comprising:

- a chamber 15 sized to receive at least one wafer 20 to be cleaned, as recited on pg.12/ll. 13-19;
- a reactant gas source inlet 80 and outlet 230, the inlet 80 and outlet 230 each communicating with the chamber 15 and defining a gas flow path for reactant gas from the inlet to the outlet, as depicted in Fig.4 and recited on pg.11/ll.13-15;
- a reactant gas source 75 coupled to the inlet 80 such that reactant gas is delivered from the inlet 80 and flows in the gas flow path to the outlet 230, as shown in Fig.4 and recited on pg.11/ll.13-15;
- a wafer carrier 25 positioned within the chamber 15 and supporting at least one wafer 20 at least partially in the gas flow path, as recited on pg.5/ll.17-18 and on pg.11/ll.13-15;
- a liquid layer former 40 coupled to the chamber 15 and operable to form a layer of liquid on at least one major surface of a wafer supported within the chamber 15, the liquid being selected (pg.26/ll.9-12) so as to be substantially non-chemically reactive with the reactant gas (pg.26/ll.7-9), as expressly recited on pg.26/ll.9-12, whereby the reactant gas is transported through the liquid layer to the wafer surface (by diffusion, pg.6/ll.20-22), as recited on pg.6/ll.18-24 & Pg.7/ll.1-4, the

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reactant gas being selected so as to chemically react with components on the surface of the wafer to clean the wafer, as recited on pg.6/ll.18-24 & Pg.7/ll.1-4.

- Regarding claim 46, Bergman et al. disclose an apparatus shown in Fig.4 for stripping photo-resist from semi-conductor wafers, the apparatus comprising:
  - a film former 40 adapted to form a film of liquid solvent onto a surface of the wafer 20 which is to be stripped of photo-resist;
  - a gas exposer 230 adapted to expose the film of liquid solvent to a source 75 of at least one reactant gas (pg.26/ll.7-9) which is substantially non-chemically reactive with the solvent (pg.26/ll.9-12) and which is chemically reactive with the photo-resist so as to strip the photo-resist from the wafer surface, as recited in pg.6/ll.18-24 & Pg.7/ll.1-4; and
  - whereby the reactant gas is transported (by diffusion, as recited on pg.6/ll.20-22) through the film of liquid solvent to the wafer surface, as recited on pg.6/ll.18-24 & Pg.7/ll.1-4.

7. Claims 40, 41, 43, and 45 are rejected under 35 U.S.C. 102(a) or 102(e) as being clearly anticipated by Bergman et al.

- Regarding claims 40 and 45, the limitation that the apparatus recited in the respective parent claims (i.e., claim 39 and 44, respectively) includes a gas incorporator adapted to introduce said at least one reactant gas into the solvent *prior to* forming the film of liquid solvent is an optional



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limitation to the apparatus depicted in Fig. 4, as expressly recited by Bergman et al. on pg.26/line 12, reciting the reactant gas (=ozone) being directly introduced into the fluid (=solvent) path 60 of Fig.4, prior to forming the film of liquid solvent by means of the film former 40. This option is more specifically recited with reference to Fig.2, whereby the reactant gas source 75 is directly introduced to the solvent path 70 and mixed together in 90 prior to forming a film on the substrate by means of the solvent applicator 40, as recited on pg.17/ll.7-8.

- Regarding claims 41, the limitation that at least one of the reactant gas comprises ozone as a major component is disclosed by Bergman et al. on pg.26/ll.7-9, and that the solvent comprises water as a major component is disclosed on pg.26/ll.9-12.
- Regarding claims 43, the limitation that the apparatus of claim 42 includes a temperature controller adapted to maintain the temperature of the wafer at the dew point of the liquid such that liquid from the liquid depositor is condensed onto the wafer to form the layer of liquid is disclosed by Bergman et al. on pg.6/ll.13-17 and further on pg.10/ll.10-13.

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*Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).*

*Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bernard E. Souw whose telephone number is (703) 305-3303. The examiner can normally be reached on Monday-Friday from 8:30 am to 5:00 pm.*

*If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudury, can be reached on (703) 306-2794. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or -7724.*

*Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center receptionist at (703) 308-0956.*

BES

Bernard E. Souw

May 02, 2000

Tom Thomas

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